PHYSICS -1

1. Following two wave trains are approaching each other.
$y_1 = a \sin 200 \pi t$ $y_2 = a \sin 208 \pi t$
The number of beats heard per second is :

A. 8 B. 4 C. 1 D. 0

2. One of the geo-stationary satellites of India is vertically above

A. New Delhi B. Mumbai C. Allahabad D. None of these

3. Light of wavelength 2400×10^{-10} m in air will become light of wavelength in glass ($\mu = 1.5$) equal to

A. 1600×10^{-10} m B. 7200×10^{-10} m C. 1080×10^{-10} m D. none of these

4. The ratio of secondary to primary turns is 4:5. If power input is *P*, what will be the ratio of power output (neglect all losses) to power input ?

A. 4:9 B. 9:4 C. 5:4 D. 1:1

5. Lenz's law applies to

A. electrostatics B. lenses
C. electro-magnetic induction D. cinema slides

6. If a proton and anti-proton come close to each other and annihilate, how much energy will be released ?

A. 1.5×10^{-10} J B. 3×10^{-10} J C. 4.5×10^{-10} J D. none of these

7. If *Sn* is doped with *As*, what will be the result ?

A. *n*-type semi-conductor B. *p*-type semi-conductor
C. intrinsic semi-conductor D. none of these

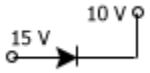
8. A charge is placed at the centre of a cube, what is the electric flux passing through one of its faces?

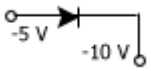
A. $(1/6) \times (q/\varepsilon_0)$ B. q/ε_0 C. $6q/\varepsilon_0$ D. None of these

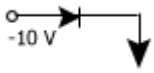
9. What is the degree of freedom in case of a mono atomic gas ?

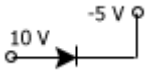
A. 1 B. 3 C. 5 D. None of these

10. The ratio of secondary to primary turns is 4:5. If power input is *P*, what will be the ratio of power output (neglect all losses) to power input ?

A. 

B. 

C. 

D. 

11. Speed of recession of galaxy is proportional to its distance

A. directly B. inversely C. exponentially D. none of these

12. If a substance goes in a magnetic field and is pushed out of it, what is it ?

A. Paramagnetic B. Ferromagnetic C. Diamagnetic D. Antiferromagnetic

13. Which is not a scalar quantity?

A. Work B. Power C. Torque D. Gravitational Constant

14. Minimum energy required to excite an electron in a Hydrogen atom in ground state is :

A. -13.6 eV B. 13.6 eV C. 10.2 eV D. 3.4 eV

15. If Gravitational Constant is decreasing in time, what will remain unchanged in case of a satellite orbiting around earth ?

A. Time period B. Orbiting radius C. Tangential velocity D. Angular velocity

16. If a transparent medium of refractive index $\mu = 1.5$ and thickness $t = 2.5 \times 10^{-5}$ m is inserted in front of one of the slits of Young's Double Slit experiment, how much will be the shift in the interference pattern ? The distance between the slits is 5.0×10^{-3} cm and that between slits and screen is 100 cm.

A. 5 cm B. 2.5 cm C. 0.25 cm D. 0.1 cm

17. How does light propagate in optical fibres?

A. Total internal reflection B. Refraction

C. Reflection D. None of these

18. Dispersion of light is due to

A. wavelength B. intensity of light C. density of medium D. none of these

19. Which of the following conclusions is correct regarding a stationary body?

A. No force is acting on the body

B. Vector sum of forces acing on the body is zero

C. The body is in vacuum

D. The forces acting on the body do not constitute a couple

20. Energy released in stars is due to

A. Fission B. Fusion C. Combustion D. Chemical reaction

21. 13 days is the half-life period of a sample. After how many days, the sample will become 1/16th of the original substance ?

A. 52 B. 3.8 C. 3 D. none of these

22. Absolute zero is the temperature at which

A. water solidifies B. all gases become liquid

C. motion of molecules becomes minimum D. everything solidifies

23. Motion of liquid in a tube is described by

A. Bernaulli's Theorem B. Poiseuille Equation C. Stoke's Law D. Archimedes' Principle

24. Molecular motion shows itself as

A. Temperature B. Internal Energy C. Friction D. Viscosity

25. Which is this gate ?

A. AND B. NAND

C. OR D. NOR

26. Energy bands in solids are a consequence of

A. Ohm's Law B. Pauli's Exclusion Principle

C. Bohr's Theory D. Heissenberg's Uncertainty Principle

27. A boy of mass M stands on the floor of an elevator moving downwards with an acceleration a which is less than g. The force exerted by the boy on the floor of the elevator is

A. Mg x Ma B. g + a C. Mg – Ma D. Mg + Ma

28. A body A of mass m_1 exerts a force on another body B of mass m_2. If the acceleration of B be a_2, then the acceleration (in magnitude) of A is

A. m_2/m_1 (a_2) B. m_1m_2 a_2 C. m_1/m_2 (a_2) D. $(m_1 + m_2)$ a_2

29. What does not change when sound enters from one medium to another ?

A. Wavelength B. Speed C. Frequency D. none of these

30. Resolving power of a microscope depends upon

A. wavelength of light used, directly B. wavelength of light used, inversely

C. frequency of light used D. focal length of objective

31. An astronaut of weight Mg is in a rocket accelerating upward with an acceleration of 4g. The apparent weight of the astronaut will be

A. 5Kg B. 4Kg C. Mg D. zero

32. One proton beam enters a magnetic field of 10^{-4} m/s normally, sp. charge = 10^{11} C/kg, velocity = 10^9 m/s. What is the radius of the circle describe by it ?

A. 0.1 m B. 100 m C. 10 m D. none of these

33. If a black body radiates 20 calories per second at 227°C, it will radiate at 727°C

A. 10 calories per second B. 80 calories per second C. 320 calories per second D. none of these

34. If a carnot engine is working with source temperature equal to 227°C and its sink temperature is at 27°C, its efficiency will be

A. 20% B. 10% C. 67% D. 50%

35. If the frequency of an oscillating particle is *n*, then the frequency of oscillation of its potential energy is

A. n B. 2n C. n/2 D. 4n

36. If an electron oscillates at a frequency of 1 GHz, it gives :

A. X-rays B. Micro-waves

C. Infra-red rays D. None of these

37. Earth's atmosphere is richest in

A. Ultra-violet rays B. Infra-red rays C. X-rays D. Micro-waves

38. Cathode rays consist of

A. Photons B. Electrons C. Protons D. α -particles

39. A body of mass m_1 is moving with a velocity V. It collides with another stationary body of mass m_2. They get embedded. At the point of collision, the velocity of the system

A. increases B. decreases but does not become zero

C. remains same D. becomes zero

40. One projectile moving with velocity V in space, gets burst into 2 parts of masses in the ratio 1:2. The smaller part becomes stationary. What is the velocity of the other part ?

A. 4V B. V C. 4V/3 D. 2V/3

41. A thief steals a box of weight W & jumps from the third floor of a building. During jump, he experiences a weight of

A. W B. 3W C. 1.5W D. zero

42. Two electron beams are moving parallel in space but in opposite directions; then

A. they will attract each other B. they will repel each other

C. no interaction will take place D. none of these

43. Two wires with resistances R and 3R are connected in parallel, the ratio of heat generated in 2R and R is

A. 1 : 3 B. 2 : 1 C. 1 : 4 D. 4 : 1

44. A wire is drawn such that its radius changes from r to $2r$, the new resistance is

A. 2 times B. 4 times C. 8 times D. 1/16 times

45. In solids, inter-atomic forces are

A. totally repulsive B. totally attractive

C. combination of (a) and (b) D. none of these

46. When horse starts running all of a sudden, the rider on the horse back falls backward because

A. he is taken aback

B. he is afraid

C. due to inertia of rest, the upper part of his body remains at rest

D. due to inertia of motion, the lower part of his body comes in motion

47. What should be the minimum velocity at the highest point of a body tied to a string, so that the string just does not slack ?

A. $\sqrt{}$ (Rg) B. $\sqrt{}$ (5Rg) C. $(R/g)^{3/2}$ D. $\sqrt{}$ (2Rg)

48. If a person standing on a rotating disc stretches out his hands, the speed will:

A. increase B. decrease

C. remain same D. none of these

49. EMF is most closely related to

A. mechanical force B. potential difference C. electric field D. magnetic field

50. Planetary system in the solar system describes

A. conservation of energy B. conservation of linear momentum

C. conservation of angular momentum D. none of these

51. Lenz's law is based upon

A. energy B. momentum C. angular momentum D. inertia

52. Faraday's second law states that mass deposited on the electrode is directly proportional to

A. atomic mass B. atomic mass x velocity C. atomic mass/valency D. valency

53. Unit of power is

A. kilowatt hour B. kilowatt per hour C. kilowatt D. erg

54. Power can be expressed as

A. F.v B. 1/2 (Fv^2) C. F.t D. F x v

55. Units of coefficient of viscosity are

A. Nms^{-1} B. $Nm^2 s^{-1}$ C. $Nm^{-2} s$ D. Nms^{-2}

56. Dimensions of torque are

A. MLT^{-2} B. ML^2T^{-2} C. $M^2L^2T^{-2}$ D. $ML^{-2}T^{-2}$

57. A body of weight *mg* is hanging on a string, which extends its length by *l*. The work

done in extending the string is

A. $mg\ l$ B. $mg\ l/2$ C. $2\ mg\ l$ D. none of these

58. The water droplets in free fall are spherical due to

A. gravity B. viscosity C. surface tension D. inter-molecular attraction

59. A ball of mass 1Kg is accelerating at a rate of $1ms^{-2}$. The rate of change of momentum is

A. 1 Kg ms^{-2} B. 2 Kg ms^{-2} C. 3 Kg ms^{-2} D. 4 Kg ms^{-2}

60. A body orbitting around earth at a mean radius which is two times as great as the parking orbit of a satellite. The period of the body is

A. 4 days B. $2\sqrt{}$ 2 days C. 16 days D. 64 days

61. If the ground state energy of H-atom is 13.6 eV, the energy required to ionize an H-atom from second excited state is :

A. 1.51 eV B. 3.4 eV C. 13.6 eV D. 12.1 eV

62. The binding energy per nucleon is maximum in case of:

A. $2He^4$ B. $_{26}Fe^{56}$ C. $_{56}Ba^{14}$ D. $_{92}U^{23}$

63. The energy of a photon of wavelength λ is :

A. $hc\ \lambda$ B. hc/λ C. $\lambda\ /hc$ D. $h\lambda\ /c$

64. Radio waves of constant amplitude can be generated with :

A. rectifier B. filter C. FET D. oscillator

65. Great bear is a

A. Star B. Galaxy C. Constellation D. Planet

66. Monoclinic crystal lattice has dimensions

A. $\alpha = \beta = \gamma$ B. $\alpha = \beta = 90°, \gamma \neq 90°$

C. $\alpha \neq \beta \neq \gamma$ D. None of these

67. Which of the following relations is correct ?

A. $E^2 = pc^2$ B. $E^2 = p^2c$ C. $E^2 = p^2c^2$ D. $E^2 = p^2/c^2$

68. During nuclear disintegration, the following is true

A. mass in conserved
B. energy is conserved
C. kinetic Energy is conserved
D. momentum is conserved

69. The nucleus forces are

A. charge-dependent B. spin-dependent C. charge-symmetric D. long range

70. During radio-active decay, the negative charged particle is emitted because of

A. X-rays
B. β emissions
C. Transmutation of neutron into proton
D. None of these

71. Particle in β - decay is

A. Neutron B. Proton C. Electron D. Photon

72. Energy in stars is produced by

A. fusion B. fission C. radioactive decay D. artificial transmutation

73. Atomic packing fraction in *bcc* lattice is

A. $1/\sqrt{\pi}$ B. $\sqrt{\pi}$ C. $\pi/\sqrt{2}$ D. None of these

74. The count of α - particles decreases from 28,800 to 1,800 in 48 hours, the half-life of this radioactive element will be

A. 4 hours B. 8 hours C. 12 hours D. 16 hours

75. Binding energy will be maximum in the case of

A. He^3 B. He^2 C. H^2 D. He^4

76. Binding energy per nucleon in heavy nuclei is of the order of

A. 8 MeV B. 8 eV C. 80 eV D. 80 MeV

77. Complete the series He^6 ---> e + Li^6 + ?

A. nutrino B. anti-nutrino C. proton D. neutron

78. Line spectrum can be obtained from

A. Sun B. Candle C. Mercury Vapour Lamp D. Electric Bulb

79. What is radius of 1st Bohr's orbit in a Hydrogen atom ?

A. 0.53×10^{-10} cm
B. 0.53×10^{-8} cm
C. 2.73×10^{-10} cm
D. 2.73×10^{-12} cm

80. What is the energy of an electron of Hydrogen in its ground state ?

A. -13.6 eV
B. 0
C. infinity
D. 13.6 eV

81. What is the rest mass of a photon ?

A. 0
B. 13.6 eV
C. 1 MeV
D. 3.1×10^{-27} kg

82. Two lenses of powers 12*D* and - 2*D* are placed together, the combined focal length will be

A. 1 cm
B. 10 cm
C. 100 cm
D. 1000 cm

83. The critical angle is maximum when light travels from

A. water to air
B. glass to air
C. glass to water
D. air to water

84. A rider on a horse back falls forward when the horse suddenly stops. This is due to

A. inertia of horse
B. inertia of rider
C. large weight of the horse
D. losing of the balance

85. Fundamental particle in an electro-magnetic wave is

A. photon
B. electron
C. phonon
D. proton

86. The wavelength is least in case of

A. γ -rays
B. X-rays
C. infrared
D. ultraviolet

87. The speed of electro-magnetic radiation in vacuum is

A. $\mu_0 \varepsilon_0$
B. $\sqrt{(\mu_0 \varepsilon_0)}$
C. $1/\mu_0 \varepsilon_0$
D. $1/\sqrt{(\mu_0 \varepsilon_0)}$

88. Power factor in *LC* oscillations is

A. 0
B. 1
C. 1/4
D. $1/\sqrt{2}$

89. 220 V is changed to 2,200 V through a step-up transformer. Th current in primary is 5 A, what is the current in the secondary ?

A. 5 A
B. 50 A
C. 0.5 A
D. 500 A

90. When a bar is placed near a strong magnet, it is repelled, then the material of the bar is

A. Dimagnetic B. Ferromagnetic

C. Paramagnetic D. Anti-ferrimagnetic

91. Electron enters into a magnetic field at an angle of 60°, its path will be

A. straight line B. circle C. parabola D. helix

92. One electron is moving in electric and magnetic fields, it will gain energy from:

A. electric field B. magnetic field C. both of these D. none of these

93. Force acting on a conductor of length 5 m carrying current 8 amperes kept perpendicular to the magnetic field of 1.5 tesla is

A. 10 N B. 100 N C. 15 N D. 50 N

94. If $E = at - bt^3$, the neutral temperature is

A. -2a/b B. -2b/a C. $\sqrt{(a/3b)}$ D. -b/2a

95. The charge carriers in an electrolyte are

A. negative ions B. positive ions C. both A and B D. none of these

96. When 4 equal resistors are connected in series with a battery and dissipate a power of 10 W, what will be the power dissipated through any of them if it is individually connected across the same battery?

A. 40 W B. 10/3 W C.90W D.10W

97. Cell of emf 1 volt is connected across a potentiometer, balancing length is 600 cm. What will be the balancing length for 2.5 volts ?

A. 400 cm B. 600 cm C. 1500 cm D. 1200 cm

98. A Wire of resistance *R* is stretched to twice its original length, what is its new resistance ?

A. 4 R B. R/9 C. 3 R D. R/3

99. The charge carriers in super-conductors are

A. electrons B. protons

C. phonons D. photons

100. 8 drops of mercury are combined to form a bigger single drop. The capacitance of a single big drop and of the single small drop will be in the ratio

A. 2 : 1 B. 1 : 8 C. 8 : 1 D. 1 : 2

Solutions:

1	2	3	4	5	6	7	8	9	10
B	D	A	D	C	B	A	A	B	C
11	12	13	14	15	16	17	18	19	20
A	C	C	B	C	B	A	A	B	B
21	22	23	24	25	26	27	28	29	30
A	C	B	A	B	B	C	A	C	B
31	32	33	34	35	36	37	38	39	40
A	B	C	C	B	D	B	B	C	C
41	42	43	44	45	46	47	48	49	50
D	B	A	D	C	C	A	B	B	C
51	52	53	54	55	56	57	58	59	60
D	C	C	A	C	B	B	C	A	B
61	62	63	64	65	66	67	68	69	70
A	B	B	D	C	C	C	C	B	C
71	72	73	74	75	76	77	78	79	80
C	A	D	C	D	A	B	C	B	A
81	82	83	84	85	86	87	88	89	90
A	B	C	B	A	A	D	A	C	A
91	92	93	94	95	96	97	98	99	100
D	A	B	C	C	A	C	A	A	A